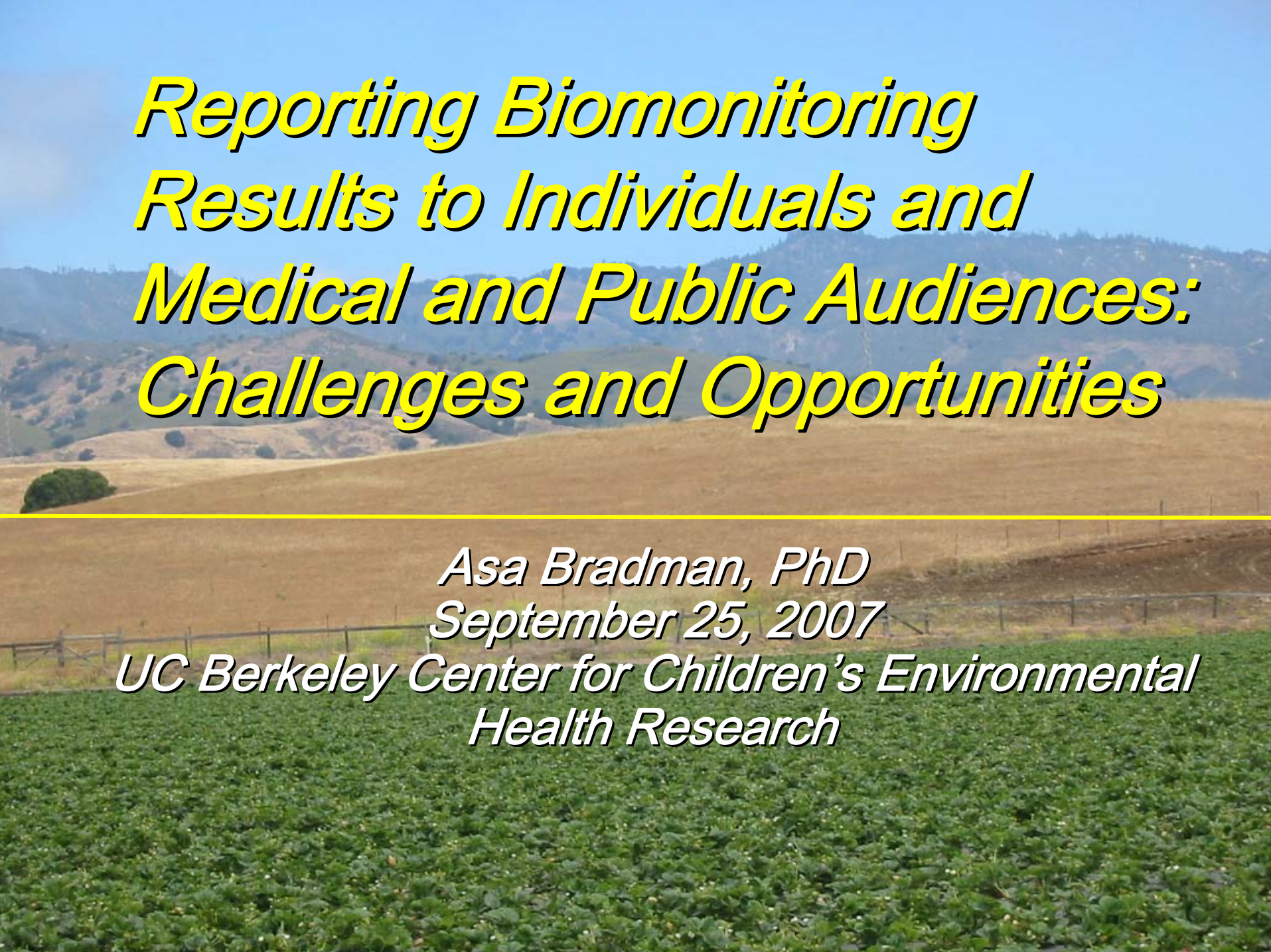


Reporting Biomonitoring Results to Individuals and Medical and Public Audiences: Challenges and Opportunities

Asa Bradman, PhD

September 25, 2007

UC Berkeley Center for Children's Environmental Health Research

Outline

- What is CHAMACOS?
- Why do it
- What have we found?
- Case studies

CDC
Department of Health and Human Services
Centers for Disease Control and Prevention

Berkeley
University of California

California Environmental Protection Agency
Protecting the Public Health and the Environment

CHAMACOS
CENTER FOR THE HEALTH ASSESSMENT OF MOTHERS AND CHILDREN OF SALINAS

dhs
California Department of Health Services

Battelle
Laboratories

A Community-University Partnership

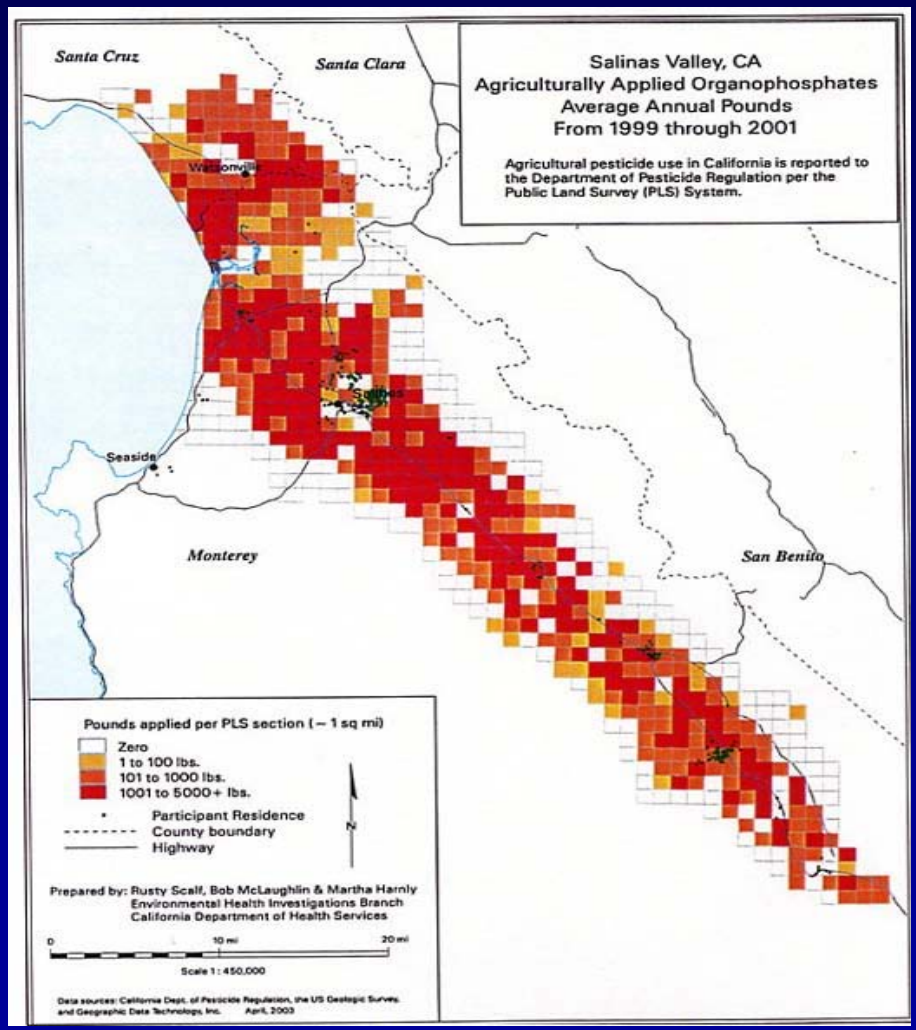
CALIFORNIA RURAL LEGAL ASSISTANCE
CRLA

Grower-Shipper Association
Of Central California

South County Outreach Effort

Clinica de Salud del Valle de Salinas

CHAMACOS Study Area



Results of Community Assessment

The Community has an interest in Environmental Health Research.

"There is a need to know how the environment is affecting us."

Children's Health is a priority concern in the Community.

"I think you will get a very positive response from the women. They are very interested in their children's health and how to improve it. You need to give them access to their results."

The Center must share results with the Community.

"I think the reaction of the community is going to be positive but you guys need to keep them informed about the study and talk the way you've talked to me about the community's long term benefits from the study, and plans to stay in the community for further studies."

Research must be culturally sensitive.

"Hire people who can work effectively with our community, people who understand the culture."

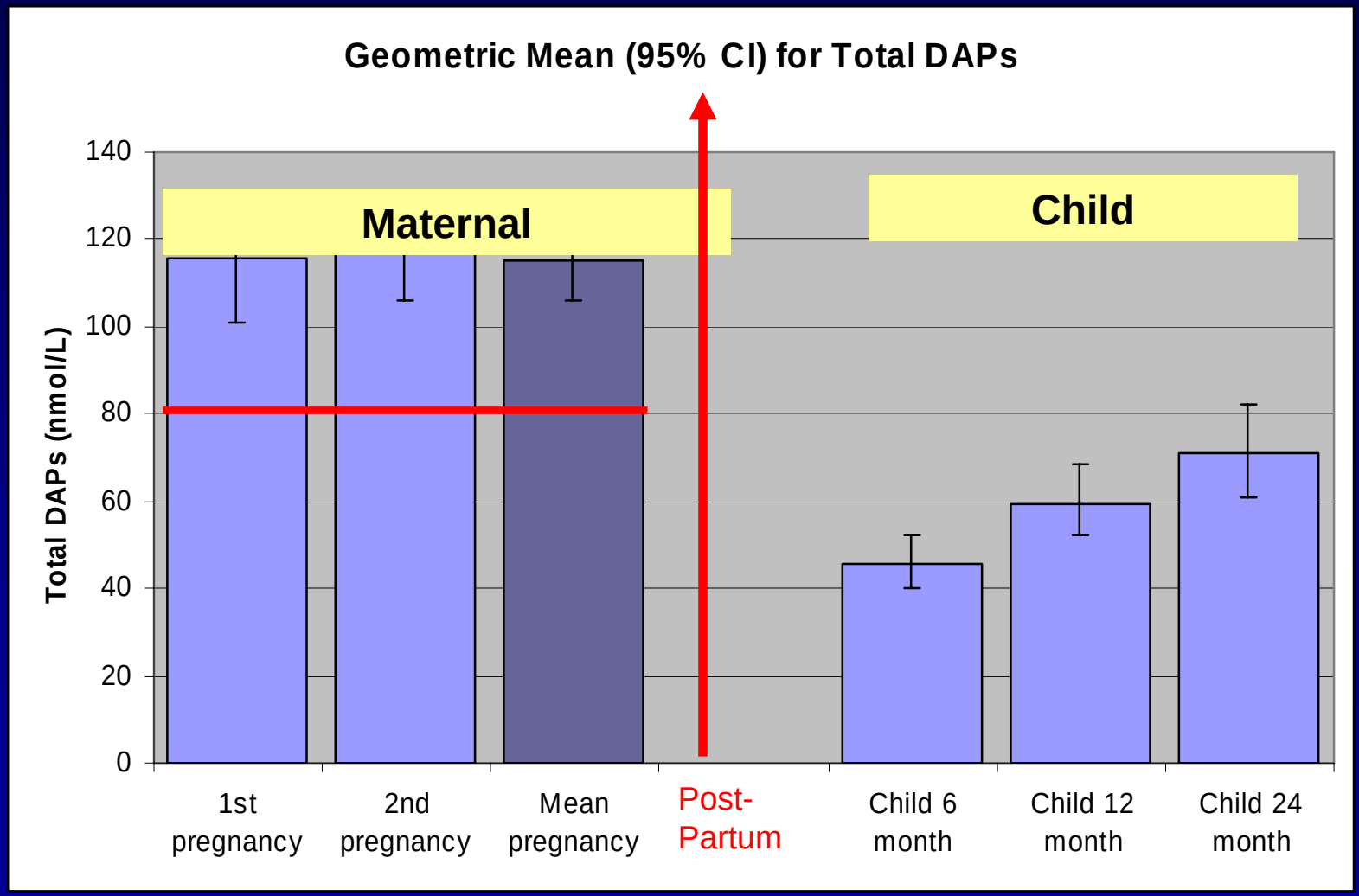
Objectives

- Assess exposures to pregnant women and children.
- Determine relationship with :
  - neurodevelopment
  - growth
  - respiratory disease
- Reduce exposures to children and pregnant women with interventions and community outreach.
- Inform policies to reduce the incidence of environmentally-related disease

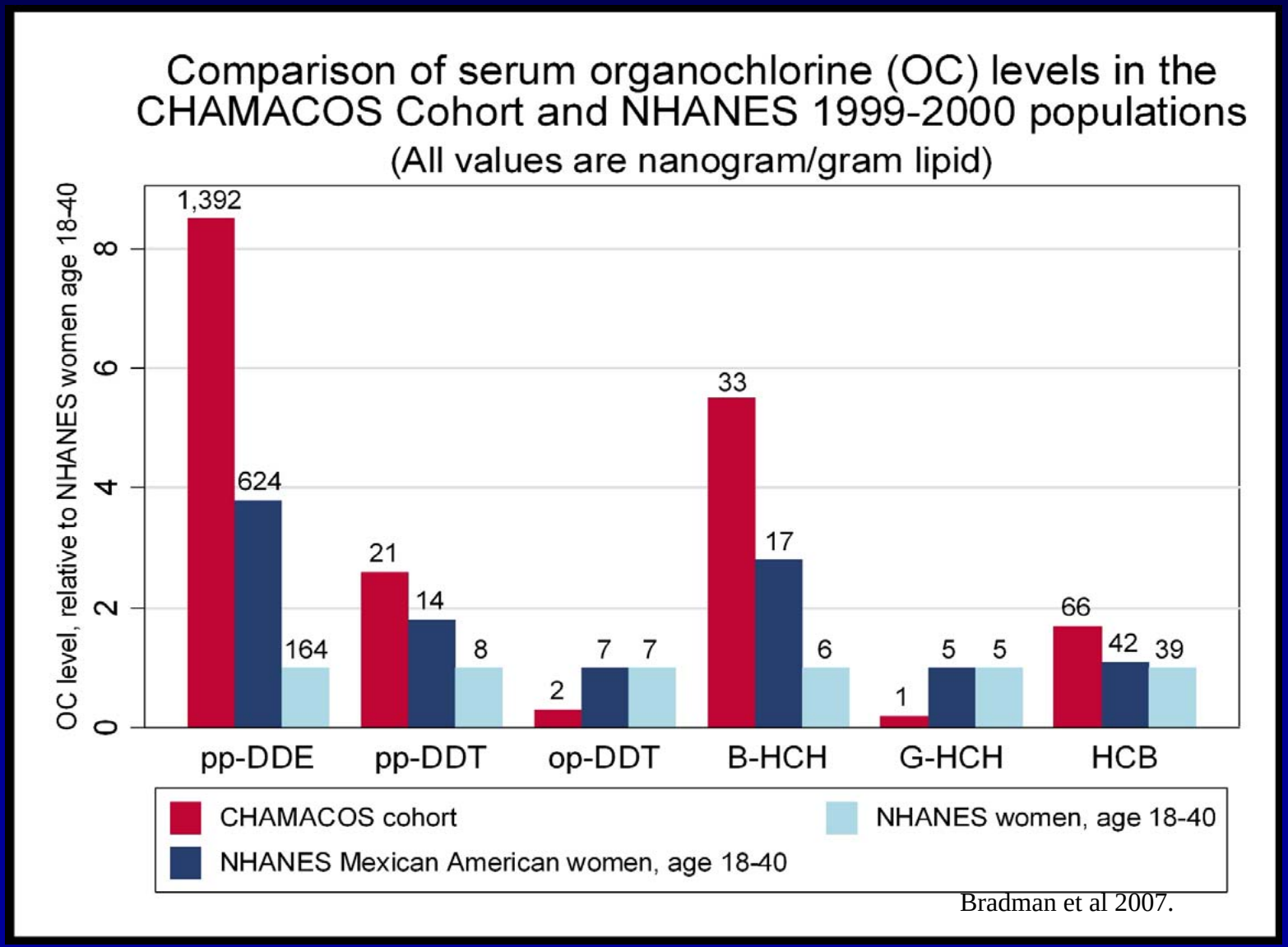
Biological Specimen Collection
Up to 75,000 samples stored

	1st Tri	2nd Tri	Delivery	6 M	1 Y	2 Y	3½ Y	5 Y	7 Y
• Maternal Urine	✓	✓	✓	✓					
• Paternal Urine			✓						
• Maternal Blood		✓	✓						✓
• Cord Blood			✓						
• Breast Milk			✓	✓					
• Child Urine				✓	✓	✓	✓	✓	
• Child Blood					✓	✓		✓	✓
• Child Saliva							✓	✓	

Prenatal and Child Total Dialkyl Phosphate (DAP) Metabolites

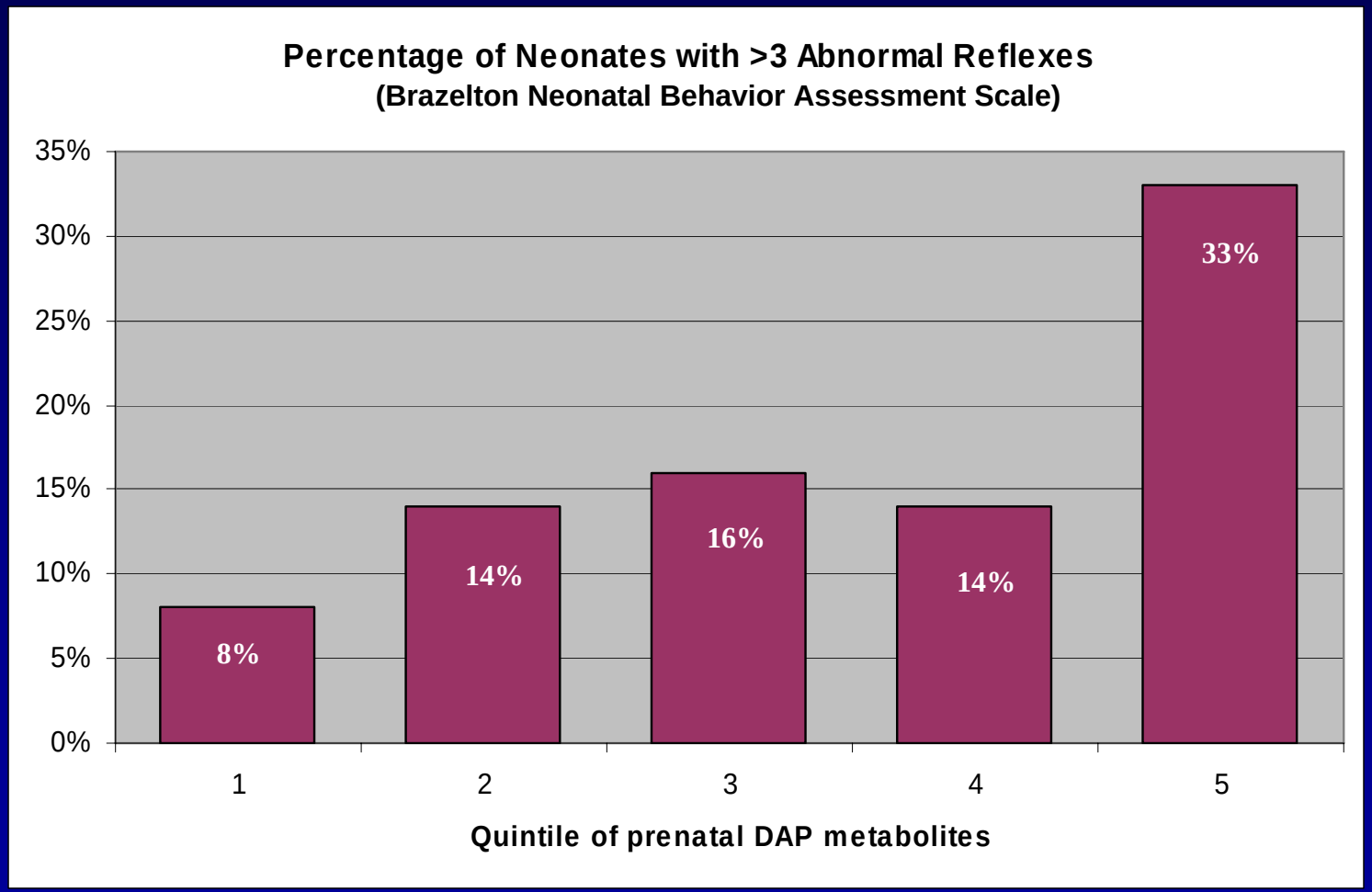


Maternal Exposure to OCs



Bradman et al 2007.

OPs and Neonatal Neurodevelopment



$X^2_{trend} = 6.7$

Young et al 2005

Neurodevelopment at 2 years

OPs

	Bayley MDI β (95% CI)	CBCL PDD OR (95% CI)
Prenatal OPs	-3.5 (-6.6, -0.5)	2.3 (1.0, 5.2)

Eskenazi et al., EHP, 2007

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DDT Linked to Developmental Delays in Babies
Breast-feeding seems to offset some of the pesticide's negative effects, study finds
By Randy Dotinga
HealthDay Reporter
WEDNESDAY, July 5 (HealthDay News) -- New research out of California suggests that DDT causes developmental delays in infants whose mothers were exposed to the pesticide.
DDT is currently banned in the United States, but officials in Africa are considering expanding its use to combat mosquitoes that spread malaria.
The new findings -- along with the potential benefits of DDT use to reduce malaria -- "need to be considered by the study author Brenda Eskenazi, a professo and maternal and child health at the Univ Berkeley.
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Last Updated: Wednesday, 5 July 2006, 04:08 GMT 05:08 UK
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DDT 'link' to slow child progress
Children exposed to the pesticide DDT while in the womb experience development problems, researchers say.
The pesticide was banned in the US and UK in the 1970s, but it is still used in some countries to kill malaria-carrying mosquitoes.
It was already known DDT was
DDT is used to protect against
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Los Angeles Times
latimes.com
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DDT Study Finds New Hazard to Young Children
Babies born in the U.S. to mothers emigrating from Mexico show mental and physical impairment, a UC Berkeley survey finds.
By Maria Cone, Times Staff Writer
July 5, 2006
Babies and toddlers of California farmworkers exposed to the insecticide DDT have neurological effects that are severe enough in some cases to slow their mental and physical development, according to research by UC Berkeley scientists published today.
The federally funded research involving the children of women who recently emigrated from Mexico to the Salinas Valley is the first in the United States to indicate that the pesticide harms human brain development.
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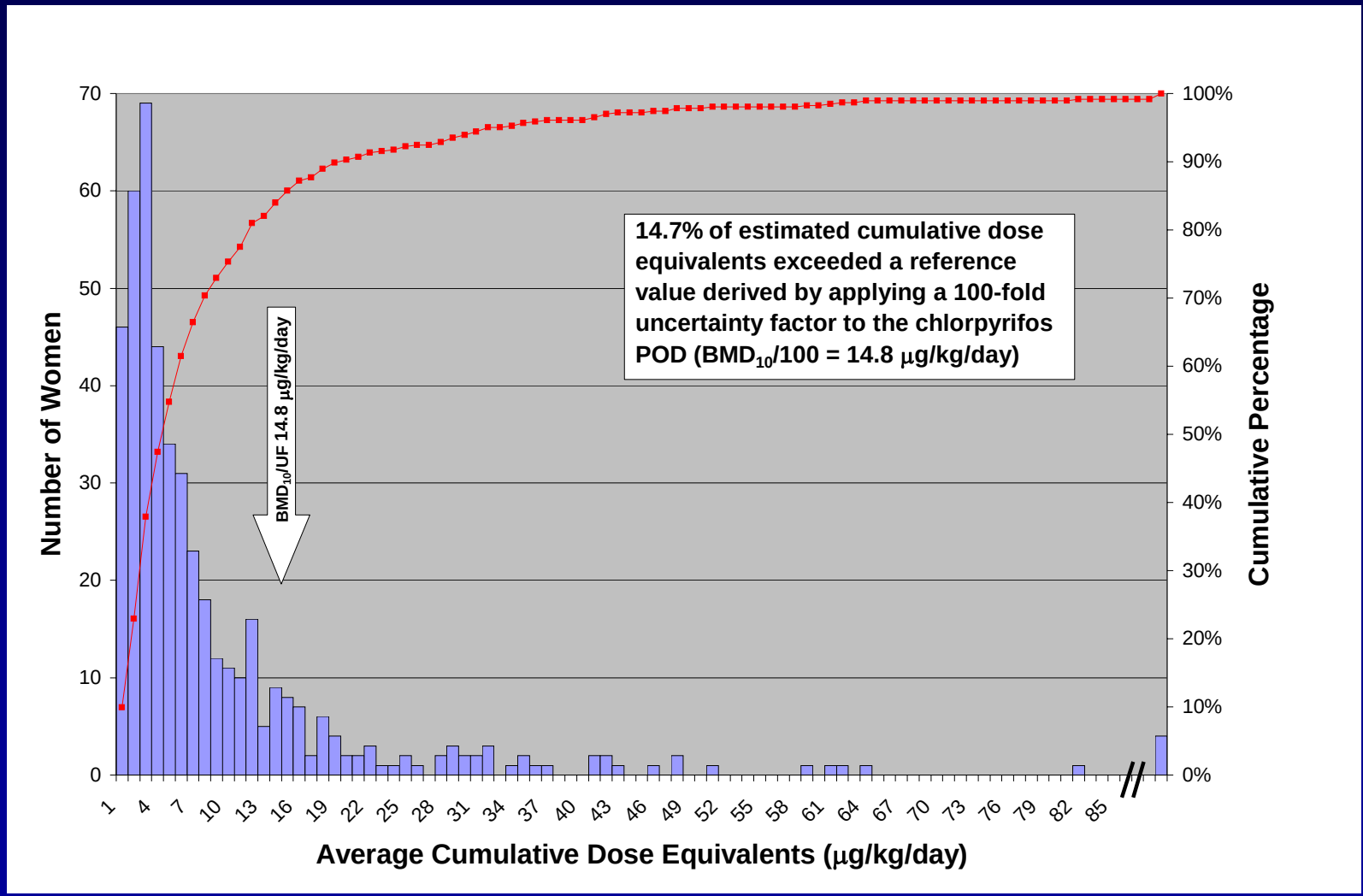
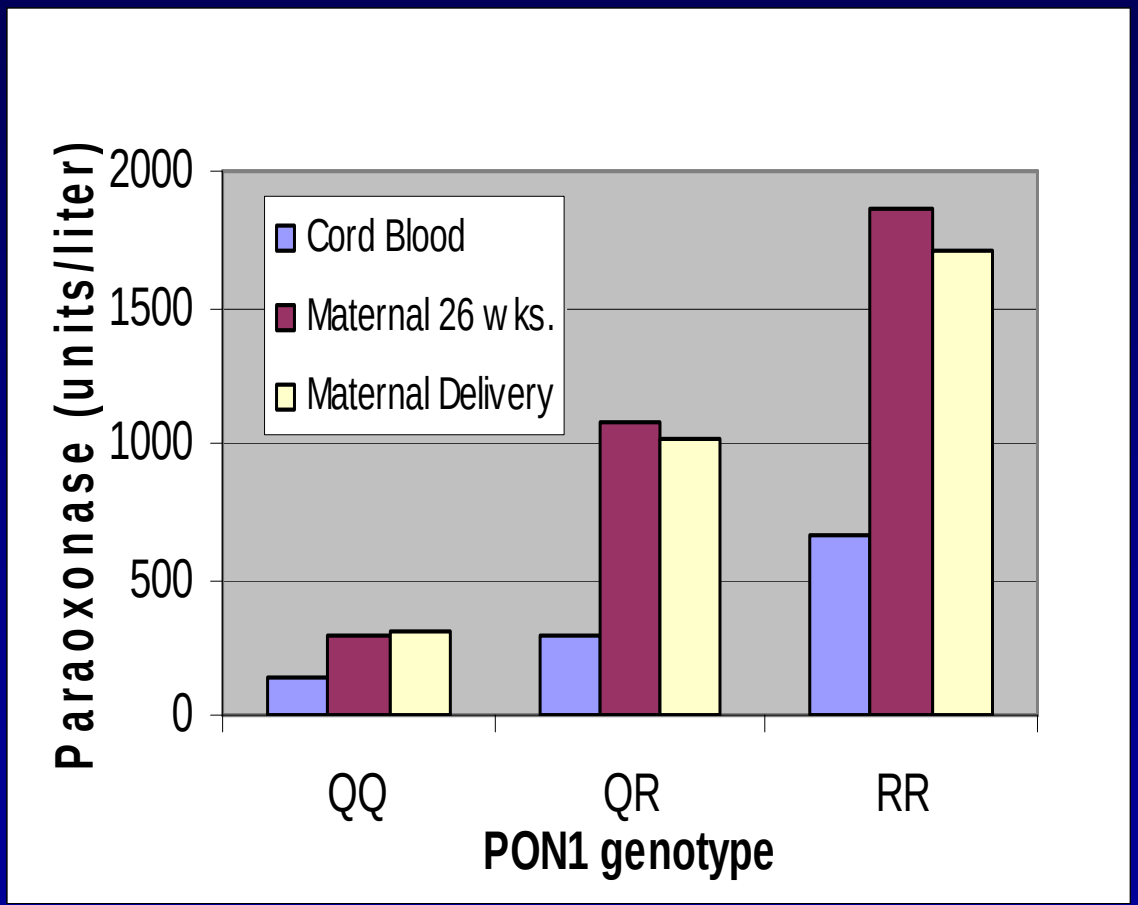
"This suggests that ... DDT has effects that no one even thought to test for back when it was in use," said Dr. Walter Rogan, an epidemiologist with the National Institute of Environmental Health Sciences. He was not involved in the new study, published in the journal Pediatrics.
Because DDT was banned more than 30 years ago in the United States and most developed countries, the findings have particular relevance for the ongoing, controversial use in Africa to combat malaria.
UC Berkeley scientists measured levels of various pesticides in 360 pregnant women, nearly all of whom were born in Mexico, and tested the mental and motor skills of their infants and toddlers, who were born in the Salinas Valley.

Distribution of Average Cumulative Pesticide Dose Estimates for CHAMACOS Women



Castorina et al, 2004

PON1 Activity Varies by Age and Genotype



Furlong et al, Holland et al, 2006

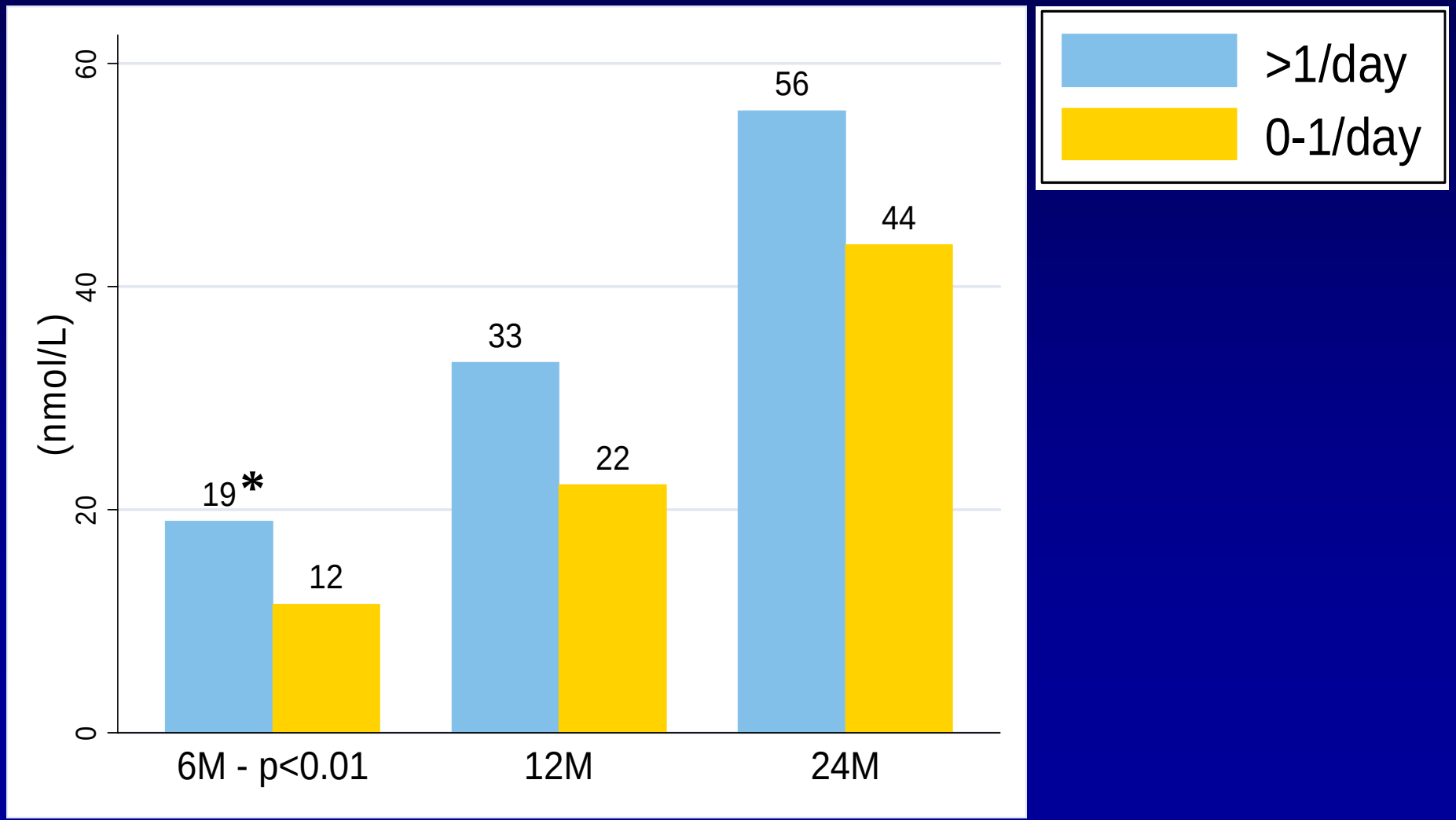
- PON1 newborns lower than adults;

therefore, greater susceptibility to OP's

- Children with QQ genotype have low level of enzyme;

therefore, may be at highest risk

Median DM Metabolite Levels by Fruit and Vegetable consumption



CHAMACOS Biomonitoring Uses

- Characterize exposure
- Evaluate exposure trends
- Evaluate health effects
- Estimate risks

Case Studies in Communication

- IRB education
- Community involvement
- Challenges by the medical community.
- Final approach.
- Technical challenges
- General community

UC Berkeley CPHS

Forbidden to return individual results (1999)

Community Engagement

- CPHS agreed to reevaluate decision.

- Convened meetings with wide range of community and research partners.

Community Engagement

•Doctors strongly objected to returning individual results –burden of interpreting non-clinical tests.

•Advocates strongly supported returning individual results – right to know.

•Industry supported returning individual results – individual right.

Final approach accepted by IRB

- Participants can request results (opt in).
- Participants informed:
  - In person;
  - Results placed in context of population and reference data (NHANES);
  - Emphasize research context;
  - Offer follow-up testing;
  - Don’t stigmatize;
  - If known risk (e.g., lead), follow guidelines.
  - Only ~20 have asked for results;
- Secondary protocol to re-test “high” results.

History Repeats Itself: CPHS II

CPHS II: 12/8/06

"test results for individual subjects … not …meaningful and … likely to cause unnecessary alarm … members felt strongly that… subjects … only be provided with a copy of the manuscript."

Technical Challenges

Biomarkers may not reflect exposure.

For example, DAPs in the environment and food suggest urinary OP biomarkers require additional interpretation.

Technical Challenges

For many non-persistent compounds, good intra-individual correlation over a day. Poor over several days.

Correlation of DAP metabolites in spot urine samples collected 1-6 days apart

Days between collection (n)

	1 (288)	2 (241)	3 (210)	4 (144)	5 (72)	6 (25)
Total DAPS	0.34**	0.21**	0.12	0.03	0.13	-0.05
Dimethyls	0.38**	0.27**	0.17*	0.07	0.16	-0.09
Diethyls	0.18**	0.03	0.00	0.02	0.05	-0.22

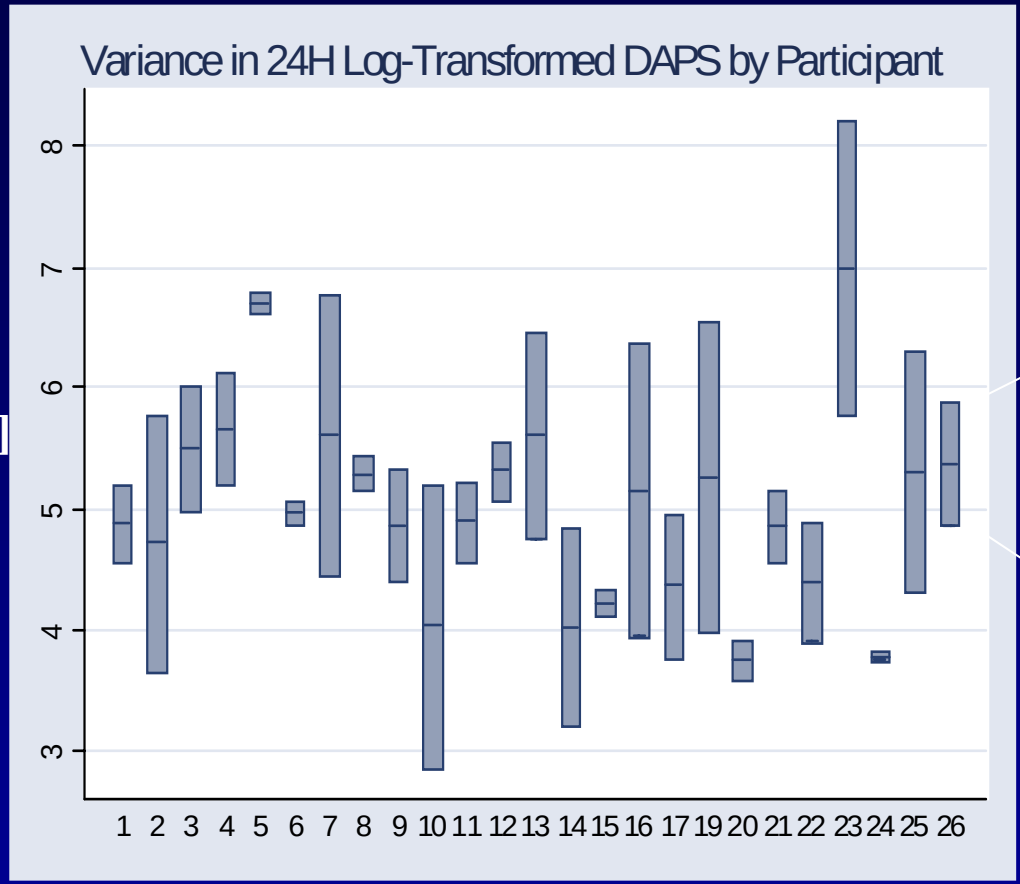
**p<0.01
*p<0.05

Correlation of 24 hr samples collected three days apart (n=25)

Total DAPS	0.11
Dimethyls	0.11
Diethyls	0.06

p>0.6

24 hr urine samples: Within and between individual variability



Estimated within and between variability (SD)

Between	**0.36**
Within	**1.01**

Technical Challenges

- Individual sampling results for some non-persistent chemicals may be meaningless.
- Whereas population exposure range is well characterized.

Reporting results to the General Community

Research partners and advisory boards:

- All findings presented during in-person meetings;
- Submitted journal articles provided for comment;
- Press releases distributed for comment;
- Review is advisory only;

General community:

- Frequent participant fora.
- Presentations to broad cross-section of community:
  - Migrant education;
  - Community groups
  - Churches;
  - Local governments;
  - Grower organizations

Community Outreach

Outreach and translation

In the home.

In the community.

In the fields.

Investigators

Exposure Studies

- Asa Bradman
- Tom McKone
- Dana Barr CDC
- Rosemary Castorina
- Martha Harnly, DHS
- Jim Leckie, Stanford
- Marcia Nishioka, Batelle
- Lesliam Quiros

Health Studies

- Brenda Eskenazi
- Ira Tager
- Kim Harley
- Laura Fenster, DHS
- Caroline Johnson
- Michael Lipsett, DHS
- Janet Macher, DHS

Mechanism Studies Center

- Nina Holland
- John Casida

Biostatistical Core

- Nick Jewell
- Alan Hubbard
- Amy Marks

Intervention and Community Outreach

- Abbey Alkon, UCSF
- Lisa Goldman
- Alicia Salvatore
- Celina Trujillo

Clinica de Salud

- John Silva
- Max Cuevas

Natividad Medical

- Marc Tunzi

www.chamacos.org

- **California Wellness Foundation**
- **Switzer Foundation**
- **UC Mexus**